Conclusion: The CCC algorithm should be used in preference to PBC in VMAT treatments of nasopharyngeal tumors. A key question remains open: should the prescription dose be adjusted to the actually delivered dose, more accurately predicted by CCC algorithm? If radiation oncologists wanted to keep the PBC original dose prescription and the same accepting criteria for target coverage when switching from PBC to CCC, up to 5% more radiation doses would be given.

EP-1557
Development of dose calculation algorithm in homogeneous phantom through the transit dose

S. Jeong[1], M. Yoon[1], D.W. Kim[2], W.K. Chung[2], M. Chung[2]
[1]*Korea University, Bio-Convergence Engineering, SEOUL, Korea Republic of*
[2]*Kyung Hee University Hospital at Gangdong, Radiation Oncology, Seoul, Korea Republic of*

Purpose or Objective: To verify the accuracy of planned dose distribution for patient treatment, patient dose quality assurance using the solid water equivalent phantom is usually performed. This method, however, is not the method of verifying the absorbed dose in real patient. In this study, as a previous process of developing dose calculation algorithm in human, we measured the transit dose using the radio-photoluminescence glass rod detector to develop dose calculation algorithm in homogeneous phantom.

Material and Methods: We measured the trasit dose at 150cm from source of linear accelerator to calculate the dose in the homogeneous phantom. The homogeneous phantom (10cm, 20cm, 30cm thickness) was located nearby the isocenter. We can calculate the dose at the bottom of phantom using the measured transit dose, inverse square law value and scatter factor. Scatter factor in this algorithm is ratio of scatter at the bottom of phantom and scatter at the measurement point of transit dose. To develop dose calculation algorithm in homogeneous phantom, we measured the field size dependence of transit dose and bottom dose to calculate the scatter factor, the relative dose response to correct the change of field size and location of isocenter. We evaluated the algorithm of 6MV X-ray beam in 10cm x 10cm field, 200MU.

Results: The measurement results of the relative dose response for isocenter location change are increased when the SSD decreases. The measured scatter factor was about 1.35 in all cases. We could calculate the dose in the phantom using the transit dose, inverse square law, scatter factor and percentage depth dose data. We evaluated the accuracy of developed phantom-dose calculation algorithm. The accuracies of 10cm, 20cm and 30cm phantom were 0.54%, 1.03% and -1.65%, respectively.

Conclusion: We developed the phantom-dose calculation algorithm using the transit dose, inverse square law, scatter factor and PDD data. This result would be used in the development of dose calculation algorithm in the inhomogeneous phantom and real patient.

EP-1558
Comparison between softwares employed in analysis of star shot patterns

J.A. Vera Sánchez[1], C. Ruiz Morales[2], A. Gonzalez Lopez[3]
[1]*Hospital Universitari Sant Joan de Reus, fisica medica, Reus, Spain*
[2]*Hospital IMED- Elche, Radioterapia, Elche, Spain*
[3]*Hospital Clínico Universitario Virgen de la Arrixaca, Radioprotección, Murcia, Spain*

Purpose or Objective: In linacs QA there are several tests that produce a star shot pattern by exposing a radiographic or radiochromic film. Isocenter size and distance from lasers or crosshair projection to radiation isocenter are some of the parameters obtained by exposing a radiochromic film with a star shot pattern of the rotation of the gantry, table or collimator. The "Twinkle" test was proposed to verify the correct deliveryng of dose during gantry rotation and it is a common QA test for linacs that deliver VMAT treatments and that also produces a star shot pattern. In this study we compare two in-house software to analyze the parameters of the star shot patterns.

Material and Methods: Digital images of star shot patterns of table, collimator and gantry rotation and Twinkle tests were obtained exposing several radiochromic films EBT3 and RT-QA. In all cases a external reference was marked onto the films. Throughout the whole process -irradiation, scanning and analysis- a reference direction was held. The digital images were analized with two different sofwares. The STAR ANALYZE software (SA), implemented with MATLAB, applies Canny algorithm to find the edges of the arms and then, the Hough transform is used to locate these edges and its equations. The second in-house software, FILM CHECK (FC) traces concentric search on the image of the star shot pattern to locate the center axes of the beams. From the characterization of these central axes, by minimax procedure position and radiation isocenter size are obtained.

Results: In the star shot patterns of gantry, table and collimator rotations, the maximum deviation between both algorithms in the isocenter size was lower than 0.5mm, and the maximum deviation in the distance between radiation isocenter and the external reference was lower than 1mm. In the Twinkle tests, the maximum deviation in the thickness of the arms of the star shot was lower than 0.3mm and the maximum deviation in the radii angle was lower than 1°.

Conclusion: The two algorithms shows a very good agreement for the analyzed parameters, despite uncertainty in the localization of the external reference system located in the radiochromic films that affects the parameters related with this external reference system. The Hough transform and the Canny edge detection algorithm are a valid tool for quality control of the linac, although, for the correct determination of sizes and distances we recommend depth knowledge and careful use of the particular parameters involved in both algorithms.

EP-1559
The Australian Clinical Dosimetry Service: The findings from a national auditing service

I.M. Williams[1], J.E. Lye[1], A.D.C. Alves[1], M.K. Shaw[1], S. Keehan[1], J. Kenny[1], J.O. Lehmann[1], L. Dunn[1], T.K. Kron[2]
[1]*ARPANSA, Australian Clinical Dosimetry Service, Victoria, Australia*
[2]*Peter MacCallum Cancer Centre, Physical Sciences, Melbourne, Australia*

Purpose or Objective: The Australian Clinical Dosimetry Service, (ACDS) was initially funded as a pilot program operating over 2011-2014 to enable the Australian Government to determine whether this design of an independent audit program was suitable for Australia. The pilot program was independently reviewed and interim funding was provided for a further two years. During this time the ACDS would increase the frequency of the developed suite of audits and develop a business plan, encompassing a user-paying structure, which would guarantee longevity for the dosimetry program. A summary of the audit outcomes and key findings to date will be presented along with a discussion about why the ACDS has been successful.

Material and Methods: The ACDS, recognised existing auditing practices, dovetailed the Level I Ionizing Radiation Oncology Centre: Houston audits with the International Atomic Energy Agency, IAEA, publications. The resulting three level audit structure resulted in a mutually supportive audit suite in which successive audits focussed on a more complex part of the clinical planning procedure. The ACDS has developed internal quality control procedures for all measurements to ensure the rigor of all audit outcomes. Critically, the ACDS has actively engaged with the professions, public and jurisdictions which has generated a positive response to the on-going success of the program.